

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification<sup>6</sup> :B32B 27/12, D04H 13/00, A61F 13/15,  
C08J 5/18

A1

(11) International Publication Number:

WO 99/14044

(43) International Publication Date:

25 March 1999 (25.03.99)

(21) International Application Number:

PCT/US98/18922

(22) International Filing Date:

10 September 1998 (10.09.98)

(30) Priority Data:

08/929,758

15 September 1997 (15.09.97)

US

(71) Applicant: KIMBERLY-CLARK WORLDWIDE, INC.  
[US/US]; 401 North Lake Street, Neenah, WI 54957 (US).

(72) Inventors: MORMAN, Michael, Tod; 555 Kings Peak, Alpharetta, GA 30202 (US). MILICEVIC, Cindy, Janja; 5045 Edisto Lane, Cumming, GA 30130 (US).

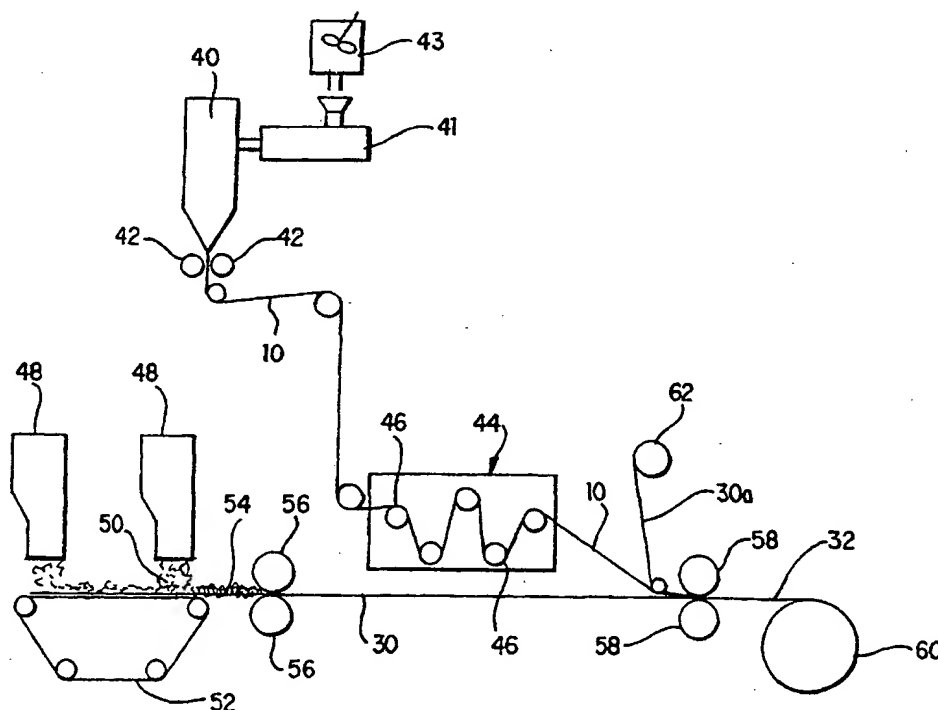
(74) Agents: FEJER, Mark, E.; Speckman Pauley Petersen &amp; Fejer, Suite 365, 2800 West Higgins Road, Hoffman Estates, IL 60195 (US) et al.

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

**Published***With international search report.**With amended claims and statement.***Date of publication of the amended claims and statement:**

6 May 1999 (06.05.99)

(54) Title: BREATHABLE ELASTIC FILM AND LAMINATE

**(57) Abstract**

A soft, breathable elastic laminate of an elastic film (10) loaded with a filler having a particle size suitable for pore formation and stretched in at least two directions to form a plurality of micropores bonded to a nonwoven web (30). In accordance with one embodiment, the elastic film is water vapor impermeable prior to being stretched.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

## AMENDED CLAIMS

[received by the International Bureau on 5 March 1999 (05.03.99);  
original claim 25 cancelled; original claims 1, 18, 19, 20, 32, 38, 43, 46,  
48, 49, 50, 51, 52 and 53 amended; remaining claims unchanged (9 pages)]

1. A soft, breathable elastic laminate comprising:  
a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation, said film having been stretched in at least two directions to form a plurality of micropores; and  
a nonwoven web bonded to said elastic film after stretching of said elastic film in at least one of said directions, said laminate being elongatable to an elongated, bias length at least 150% of its relaxed unbiased length.
2. A laminate in accordance with Claim 1, wherein said two directions of stretch are perpendicular to one another.
3. A laminate in accordance with Claim 1, wherein said elastic film is stretched in said second direction after bonding of said nonwoven web.
4. A laminate in accordance with Claim 1, wherein said elastic film is stretched in said second direction prior to bonding of said nonwoven web.
5. A laminate in accordance with Claim 1, wherein said nonwoven web is bonded to said elastic film while said elastic film is stretched in at least one of said two directions.
6. A laminate in accordance with Claim 1, wherein said elastic film is annealed, said annealing occurring during said stretching of said film.
7. A laminate in accordance with Claim 1, wherein said elastic film comprises a metallocene ethylene-based polymer.
8. A laminate in accordance with Claim 7, wherein said polymer is selected from the group consisting of copolymers of ethylene and butylene, copolymers of

ethylene and hexene, copolymers of ethylene and octene, and combinations thereof.

9. A laminate in accordance with Claim 1, wherein said filler comprises in a range of about 10% to about 50% by volume of said elastic film.

10. A laminate in accordance with Claim 7, wherein said metallocene ethylene-based polymer has a density in a range of about 0.850 to about 0.917 g/cc.

11. A laminate in accordance with Claim 1, wherein said elastic film has an activation permanent set of greater than about 50%.

12. A laminate in accordance with Claim 11, wherein said film has an activation permanent set in a range of about 100% to about 400%.

13. A laminate in accordance with Claim 1, wherein said nonwoven web comprises a spunbond web.

14. A laminate in accordance with Claim 13, wherein said spunbond web comprises polypropylene.

15. A laminate in accordance with Claim 1 having an WTVR in a range of about 1000 to about 5000 g/m<sup>2</sup>/24 hours.

16. A laminate in accordance with Claim 1 further comprising a second nonwoven web.

17. A laminate in accordance with Claim 1, wherein said filler is calcium carbonate.

18. A diaper outercover comprising:  
a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation and stretched in at least two directions to form a plurality of micropores; and  
a nonwoven web bonded to said elastic film after stretching of said elastic film in at least one of said directions, said outercover being elongatable to an elongated, bias length at least 150% of its relaxed unbiased length.
19. A surgical gown comprising:  
a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation and stretched in at least two directions to form a plurality of micropores; and  
a nonwoven web bonded to said elastic film after stretching of said elastic film in at least one of said directions, said gown being elongatable to an elongated, bias length at least 150% of its relaxed unbiased length.
20. A breathable elastic film comprising:  
a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation and stretched in at least two directions to form a plurality of micropores, and having a permanent set after a last said stretching of less than about 30% in a direction of said last stretching.
21. A film in accordance with Claim 20, wherein said filler is calcium carbonate.
22. A film in accordance with Claim 21, wherein said calcium carbonate comprises in a range of about 10% to about 50% by volume of said elastic film.
23. A film in accordance with Claim 20 having a pore activation permanent set of greater than about 50%.

24. A film in accordance with Claim 20, wherein said filler comprises in a range of about 10% to about 50% by volume of said elastic film.

26. A film in accordance with Claim 20, wherein said substantially water vapor impermeable elastic film is stretched in a machine direction followed by stretching in a cross-machine direction.

27. A film in accordance with Claim 20, wherein said substantially water vapor impermeable elastic film is stretched in a cross-machine direction followed by stretching in a machine direction.

28. A film in accordance with Claim 20, wherein said substantially water vapor impermeable elastic film comprises a metallocene ethylene-based polymer.

29. A film in accordance with Claim 28, wherein said metallocene ethylene-based polymer has a density in a range of about 0.850 to about 0.917 g/cc.

30. A film in accordance with Claim 20, wherein said filler has an average said particle size in a range of about 0.5 to about 8 microns in diameter.

31. A film in accordance with Claim 20, wherein a nonwoven web is bonded thereto, forming a film/nonwoven laminate.

32. A process for producing a soft, breathable elastic laminate comprising the steps of:

stretching a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation in at least two directions so as to form a plurality of micropores; and

bonding a nonwoven web to said stretched elastic film, forming a laminate which is elongatable to an elongated, bias length at least 150% of its relaxed unbiased length.

33. A process in accordance with Claim 32, wherein said substantially water vapor impermeable elastic film is stretched in a machine direction followed by stretching in a cross-machine direction.

34. A process in accordance with Claim 32, wherein said substantially water vapor impermeable elastic film is stretched in a cross-machine direction followed by stretching in a machine direction.

35. A process in accordance with Claim 32, wherein said substantially water vapor impermeable elastic film comprises a metallocene ethylene-based polymer.

36. A process in accordance with Claim 35, wherein said metallocene ethylene-based polymer has a density in a range of about 0.850 to about 0.917 g/cc.

37. A process in accordance with Claim 32, wherein said filler comprises in a range of about 10% to about 50% by volume of said elastic film.

38. A process for producing a breathable elastomeric film comprising the steps of:

stretching a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation in at least two directions so as to form a plurality of micropores, said film having a permanent set after a last said stretching of less than about 30% in a direction of said last stretching.

39. A process in accordance with Claim 38, wherein said substantially water vapor impermeable elastic film is stretched in a machine direction followed by stretching in a cross-machine direction.

40. A process in accordance with Claim 38, wherein said substantially water vapor impermeable elastic film is stretched in a cross-machine direction followed by

stretching in a machine direction.

41. A process in accordance with Claim 38, wherein said substantially water vapor impermeable elastic film comprises a metallocene ethylene-based polymer.

42. A process in accordance with Claim 41, wherein said metallocene ethylene-based polymer has a density in a range of about 0.850 to about 0.917 g/cc.

43. A soft, breathable elastic laminate comprising:  
a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation, said film having been stretched in at least two directions to form a plurality of micropores; and

a neckable nonwoven web bonded to said elastic film after stretching of said elastic film in at least one of said directions, said laminate being elongatable to an elongated, bias length at least 150% of its relaxed unbiased length.

44. A laminate in accordance with Claim 43, wherein said neckable nonwoven web is necked prior to being bonded to said elastic film.

45. A laminate in accordance with Claim 44, wherein said necked nonwoven web is bonded to said elastic film while said elastic film is stretched in a direction perpendicular to a necking direction.

46. A soft, breathable elastic laminate comprising:  
a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation, said film having been stretched in at least two directions to form a plurality of micropores; and

a necked nonwoven web bonded to said elastic film after stretching of said elastic film in at least one of said directions, said laminate being elongatable to an elongated, bias length at least 150% of its relaxed unbiased length.



47. A laminate in accordance with Claim 46, wherein said necked nonwoven web is bonded to said elastic film while said elastic film is stretched in a direction perpendicular to a necking direction.

48. A soft, breathable elastic laminate comprising:  
a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation, said film having been stretched in at least two directions to form a plurality of micropores; and

a necked spunbond bonded to said elastic film after stretching of said elastic film in said at least two directions, said laminate being elongatable to an elongated, bias length at least 150% of its relaxed unbiased length.

49. A soft, breathable elastic laminate comprising:  
a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation, said film having been stretched in at least two directions to form a plurality of micropores; and

a necked spunbond bonded to said elastic film, whereby said film is stretched in a machine direction and said necked spunbond is bonded to said film after said stretching in said machine direction, forming said laminate, and said laminate is stretched in a cross-machine direction, said laminate being elongatable to an elongated, bias length at least 150% of its relaxed unbiased length.

50. A soft, breathable elastic laminate comprising:  
a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation, said film having been stretched in a machine direction and a cross-machine direction to form a plurality of micropores; and

a spunbond bonded to said elastic film while said elastic film is stretched in said machine direction, said laminate being elongatable to an elongated, bias length at least 150% of its relaxed unbiased length.

51. A soft, breathable elastic laminate comprising:

a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation, said film having been stretched in a machine direction and a cross-machine direction to form a plurality of micropores; and

a spunbond bonded to said elastic film while said elastic film is stretched in said machine direction and said cross-machine direction, said laminate being elongatable to an elongated, bias length at least 150% of its relaxed unbiased length.

52. A soft, breathable elastic laminate comprising:

a substantially water vapor impermeable elastic film loaded with a filler having a particle size suitable for pore formation, said film having been stretched in a machine direction and a cross-machine direction to form a plurality of micropores; and

a necked spunbond bonded to said elastic film while said elastic film is stretched in said machine direction, said laminate being elongatable to an elongated, bias length at least 150% of its relaxed unbiased length.

53. A breathable elastic film comprising:

an elastic film loaded with a filler having a particle size suitable for pore formation and stretched in at least two directions to form a plurality of micropores, and having a permanent set after a last said stretching of less than about 30% in a direction of said last stretching.

54. A breathable elastic film in accordance with Claim 53, wherein said elastic film is substantially water vapor impermeable.

55. A breathable elastic film in accordance with Claim 53, wherein said elastic film is water vapor permeable.

56. A film in accordance with Claim 53, wherein said filler is calcium carbonate.

57. A film in accordance with Claim 56, wherein said calcium carbonate comprises in a range of about 10% to about 50% by volume of said elastic film.

58. A film in accordance with Claim 53, wherein said filler comprises in a range of about 10% to about 50% by volume of said elastic film.

59. A film in accordance with Claim 53, wherein said elastic film is stretched in a machine direction followed by stretching in a cross-machine direction.

60. A film in accordance with Claim 53, wherein said elastic film is stretched in a cross-machine direction followed by stretching in a machine direction.

61. A film in accordance with Claim 53, wherein a nonwoven web is bonded thereto, forming a film/nonwoven laminate.

62. A film in accordance with Claim 53, wherein the WVTR of said film is at least about 300 g/m<sup>2</sup>/24 hours greater than the WVTR of said elastic film without said filler after being stretched the same as said elastic film loaded with said filler.

## STATEMENT UNDER ARTICLE 19

Claims 2-17, 21-24, 26-31, 33-37, 39-42, 44-45, 47, and 54-62 remain the same, as originally filed. Applicant is submitting replacement pages 15-23, inclusive. Original Claims 1, 18, 19, 20, 32, 38, 43, 46, 48, 49, 50, 51, 52 and 53 have been deleted and replaced with new Claims 1, 18, 19, 20, 32, 38, 43, 46, 48, 49, 50, 51, 52 and 53. Original Claim 25 has been deleted.

Claims 1, 18, 19, 32, 43, 46, 48, 49, 50, 51 and 52 have been amended to more clearly recite the laminate and articles using the laminate of the claimed invention. More particularly, these claims have been amended so as to further characterize the elasticity of the claimed laminate and articles using said laminate consistent with the definition of the term "elastic" as set forth in the description.

Claims 20, 38 and 53 have been amended to require that the elastic film of the claimed invention have a specified permanent set consistent with original Claim 25 of the application as originally filed.